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Review of fungus-feeding urothripine species from China, with descriptions of two new species (Thysanoptera:Phlaeothripidae)

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Abstract

Twelve species of urothripine Phlaeothripidae are recorded from China, including two new species that are described and illustrated here, *Stephanothrips austrinus* sp. n. and *Urothrips calvus* sp. n. A new key is provided to the urothripine species known from China together with new collection data.

Key words: leaf-litter thrips, Phlaeothripinae, *Stephanothrips*, *Urothrips*, new species

Introduction

The urothripines are a group of fungus-feeding Phlaeothripinae species living mainly in leaf-litter of the tropics and subtropics. This group is generally characterized by the head usually being strongly tuberculate, abdominal segment IX more than twice as long as segment VIII, and the tube usually greatly elongate and bearing very long anal setae (Mound 1972; Okajima 2006). It is generally considered an enigmatic group, not only by its bizarre external morphology, but also by its generic classification. A total of 17 genera had been proposed as the Tribe Urothripini by Stannard (1970), however, the ambiguous generic definitions within the Urothripini in that paper were not widely accepted. Subsequently, the complicated patterns of variation amongst urothripines were discussed by Mound (1972), who treated four genera, *Verrucothrips*, *Ramachandraiella*, *Transithrips* and *Bournieria*, as junior synonyms of *Baenothrips*. Subsequently, Bhatti (1998) synonymised *Ananthakrishnaniella* with *Coxothrips*, and more recently Ulitzka and Mound (2014) considered *Coxothrips* and *Biconothrips* as synonyms of *Urothrips*. To date, urothripines include 10 genera, four of which are monobasic (ThripsWiki 2017).

The objective of the present study is to describe two urothripine species as new to science and review the known Chinese urothripine species based on re-examination of more than 300 slide-mounted specimens of this group deposited in the authors' collection (SCAU), some specimens of the Tokyo University of Agriculture (TUA, Japan) and the National Zoological Museum of China (NZMC).

Materials and methods

Litter-dwelling thrips were extracted with modified Tullgren funnels, using 60W bulbs suspended 5 cm above the top of the litter samples over 10h until the litter dried and became fragile. Specimens were then preserved in 90% ethanol. Specimens on living plants or on dead hanging twigs were collected by beating vegetation over a white plastic tray using a stick, and then removed with a fine brush into collection vials contained 90% ethanol, into which a small pencil written collecting information label was inserted. The specimens were then mounted onto slides in Canada balsam using the methods by Zhang *et al.* (2006). Slide-mounted specimens were examined and photographed under the microscope with a digital camera attached, and the images subsequently processed with Adobe Photoshop CS6. All specimens examined, including types, are deposited in the Collection of Aquatic Insects and Soil Animals, Department of Entomology, College of Agriculture, South China Agricultural University

(SCAU), Guangzhou, China. Slide-mounted specimens of *S. japonicus*, *S. kentingensis* and *S. occidentalis* have also been examined, provided by Prof. Okajima from the Tokyo University of Agriculture (TUA, Japan).

Key to urothripine species from China (females)

1. Antennae 5-segmented (morphological segments III–V united) (Figs 17, 26); apterous; meso- and metafurcae placed laterally and widely separated (Figs 19–22) 2
- Antennae 7- or 8-segmented (segments III–V completely separated) (Figs 8, 10); apterous or macropterous; mesothoracic furcae fused together medially, but metathoracic furcae widely separated (Fig. 12) 7
2. Head with 1–3 pairs of cephalic setae on anterior margin of head 3 (*Stephanothrips*)
- Head without any prominent cephalic setae on anterior margin of head (Figs 23–25); eyes with 3 ommatidia dorsally (Fig. 25); pronotum with a pair of prominent epimeral setae (Fig. 24) *Urothrips calvus* sp. n.
3. Head with 3 pairs of elongate anterior cephalic setae 4
- Head with less than 3 pairs of anterior cephalic setae 5
4. Metanotum and abdominal tergite I closely fused, but the latter well separated from tergite II; fore tarsus without hamus or hook; all tibiae brown to dark brown *S. formosanus*
- Metanotum and abdominal tergite I well separated, but tergite I fused to tergite II; fore tarsus with an external hamus or hook; all tibiae yellow shaded with pale brown medially *S. occidentalis*
5. Head with only one pair of anterior cephalic setae; antennae yellow except segment V shaded with light brown distally; pronotum without a pair of prominent epimeral setae; abdominal tergite I yellow (Fig. 2) *S. japonicus*
- Head with 2 pairs of anterior cephalic setae, inner pair much longer than outer pair 6
6. Antennae yellow except segments IV–V brown (Figs 1, 17); pronotal epimeral setae well-developed (Fig. 14); abdominal tergite I and hind femora (including coxae) largely brown (Fig. 1) *S. australinus* sp. n.
- Antennae yellow except the brown segment V; pronotal epimeral setae minute or absent; abdominal tergite I and hind femora (including coxae) largely yellow (Fig. 3) *S. kentingensis*
7. Head without any prominent cephalic setae on anterior margin of head 8
- Head with 1–3 pairs of cephalic setae on anterior margin of head 10
8. Macropterous, antenna 8-segmented (Fig. 8); head strongly prolonged in front of eyes (Fig. 7); fore wings slender and strongly tuberculate in basal third *Habrothrips curiosus*
- Apterous, antenna 7-segmented 9 (*Urothrips*)
9. Frons prolonged in front of eyes; pronotal epimeral setae blunt at apex *U. gibberosa*
- Frons broadly rounded in front of eyes; pronotal epimeral setae expanded at apex *U. tarai*
10. Antenna 7-segmented; head with only one pair of elongate anterior cephalic setae (Fig. 9), and about 15 pairs of major setae expanded at apex on dorsal surface; tube with 2 pairs of elongate setae subequal in length *Bradythrips zhangi*
- Antenna 8-segmented; head with 3 pairs of anterior cephalic setae 11 (*Baenothrips*)
11. Three ocelli present; head with a wedge-shaped reticulation extending from median to the posterior margin; mesoacrotergite strongly constricted medially *B. cuneatus*
- Ocelli absent; head reticulate only medially; mesoacrotergite not constricted medially *B. ryukyuensis*

***Baenothrips* Crawford**

Baenothrips Crawford, 1948: 39. Type species *Baenothrips guatemalensis* Crawford 1948, by monotypy.

A total of 12 species from around the world are currently listed in this genus (ThripsWiki 2017), with two recorded from China.

***Baenothrips cuneatus* Zhao & Tong**

Baenothrips cuneatus Zhao & Tong, 2016: 68.

Specimens examined. China, Guangdong, Type specimens (Holotype and paratypes in SCAU).

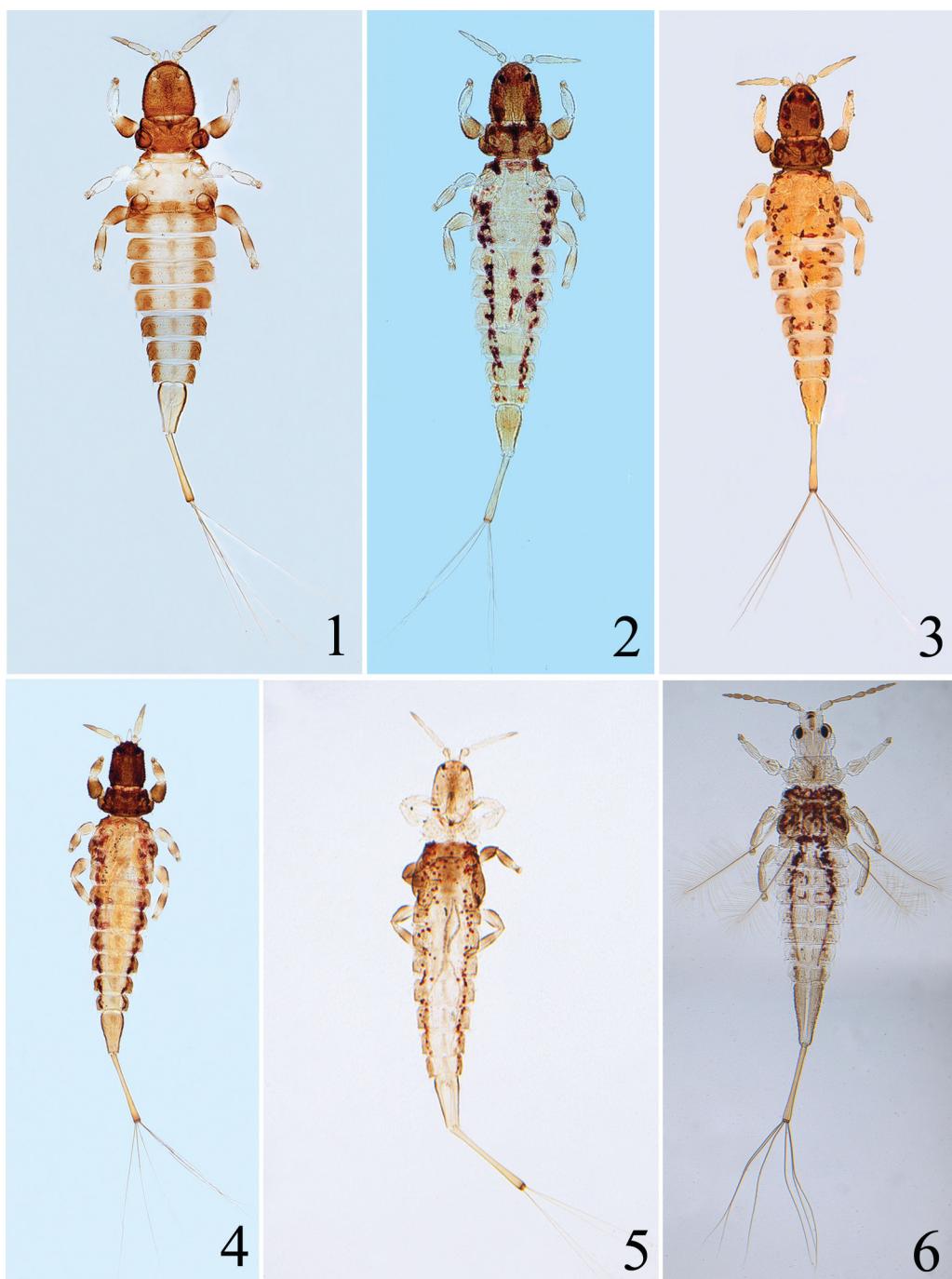
Distribution. China (Hunan, Guangdong, Guangxi, Yunnan, Hainan).

***Baenothrips ryukyuensis* Okajima**

Baenothrips ryukyuensis Okajima, 1994: 517.

Specimens examined. Not studied. The distribution information is based on Dang and Qiao (2014).

Distribution. China (Fujian, Taiwan); Japan.

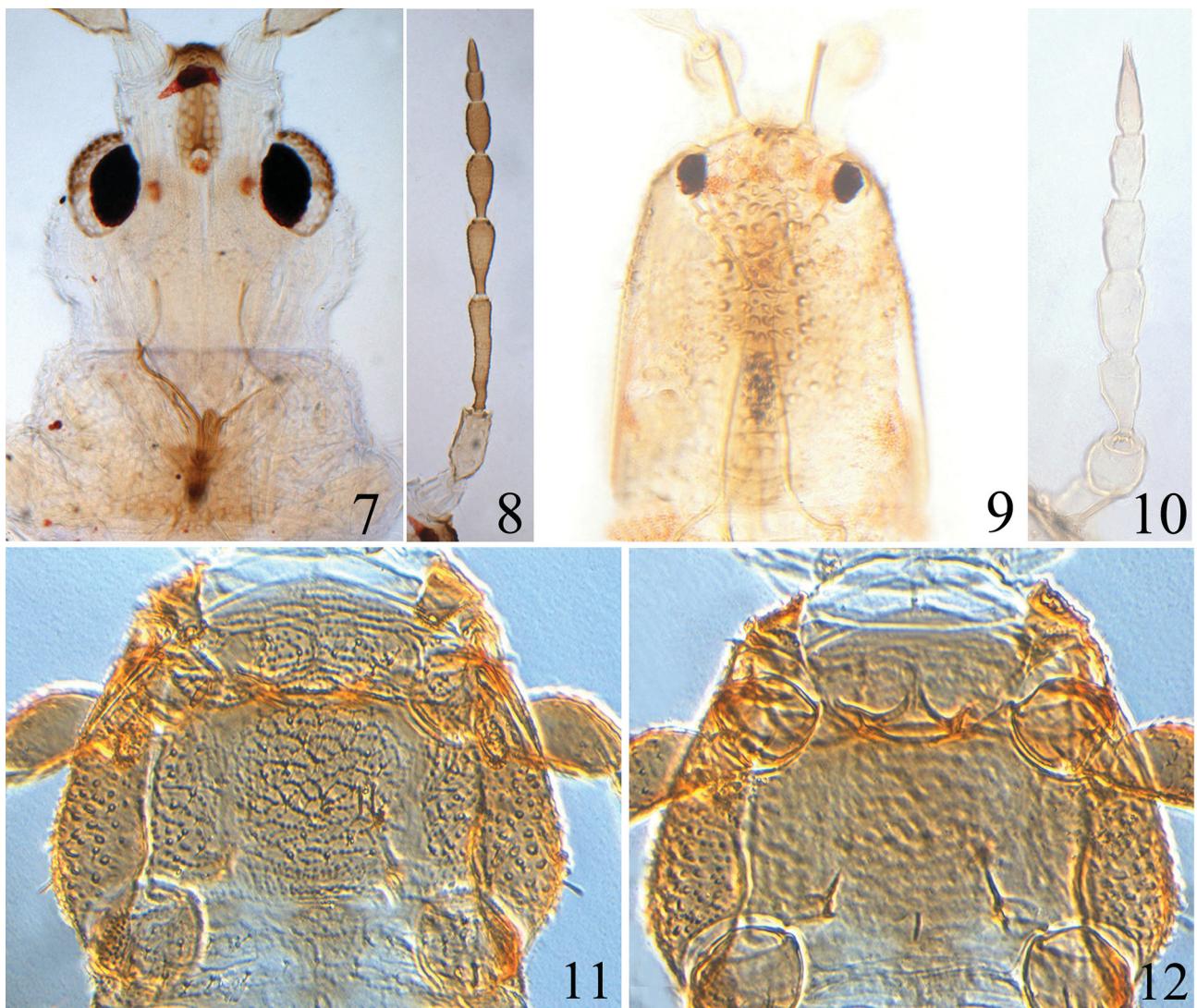


FIGURES 1–6. Habitus of female: (1) *Stephanothrips austrinus* sp. n.; (2) *S. japonicus* Saikawa; (3) *S. kentingensis* Okajima; (4) *S. occidentalis* Hood & Williams; (5) *Bradythrips zhangi* Wang & Tong; (6) *Habrothrips curiosus* Ananthakrishnan

***Bradythrips* Hood & Williams**

Bradythrips Hood & Williams, 1925: 68. Type species *Bradythrips hesperus* Hood & Williams 1925, by monotypy.

Six species are recognized in this genus. These are probably all originally from Southeast Asia, because *B. hesperus* that was described from South America has also been recorded from Borneo (Okajima 1987).



FIGURES 7–12. (7) head of *Habrothrips curiosus*; (8) antenna of *H. curiosus*; (9) head of *Bradythrips zhangi*; (10) antenna of *B. zhangi*; (11) meso- and metanotum of *B. zhangi*; (12) pterothorax of *B. zhangi*, ventral view.

***Bradythrips zhangi* Wang & Tong**

(Figs 5, 9–12)

Bradythrips zhangi Wang & Tong, 2007: 298.

Specimens examined. Type specimens (Holotype and paratypes in SCAU). Other specimens: **China**, Guangdong province, Gaozhou City, Mt. Sanguanshan ($21^{\circ}55'10''N$, $111^{\circ}8'40''E$), 2 females and 2 males collected from leaf litter of *Acacia auriculiformis* (Leguminosae), 5.ix.2015 (Zhaohong Wang).

Distribution. China (Guangdong).

Comments: This apterous species is characterized by the head having one pair of elongate anterior cephalic setae (Figs 5, 9), and about 15 pairs of major setae expanded at apex on the dorsal surface (about 6 pairs of setae near cheeks); antenna 7-segmented (Fig. 10); pronotal epimeral setae well-developed, meta-epimeron bulging with one well developed seta (Fig 11); mesoeusternum anterior margin entire, mesothoracic furcae united together medially, but metathoracic furcae widely separated (Fig. 12); tube with 2 pairs of elongate setae subequal in length, about 2.7 times as long as tube.

***Habrothrips* Ananthakrishnan**

Habrothrips Ananthakrishnan, 1967: 137. Type species: *Habrothrips curiosus* Ananthakrishnan, by monotypy.

This genus remains known from a single species that is widespread across Southeast Asia to Australia (ThripsWiki 2017).

***Habrothrips curiosus* Ananthakrishnan**

(Figs 6–8)

Habrothrips curiosus Ananthakrishnan, 1967: 138.

Specimens examined. **China**, Guangdong, Guangzhou City, Longdong Forest Park (23°14'N, 113°24'E), 1 female collected from leaf litter, 30.ix.2007 (Jun Wang).

Distribution. China (Guangdong, Taiwan); India, Thailand, Malaysia and Australia.

Comments: This species was described from southern India in 1967, and recorded later from Australia (Mound 1972), Thailand (Kudô 1978), Taiwan (Chen 1980) and Malaysia (Dang *et al.* 2014). It is here newly recorded from mainland China. This specimen has the head strongly prolonged in front of the eyes, with a pair of prominent setae with expanded apices near eyes (Fig. 7); antennae 8-segmented (Fig. 8), segment III with 2 sense cones, IV with 3 sense cones; pronotal epimeral setae well-developed; meta-epimeron with one well-developed seta; fore wings slender but strongly tuberculate on basal third (Fig. 6); abdominal tergite IX elongate, much longer than head, but slightly shorter than tube. Mound (1972) pointed out that the number of sense cones on segment III varies from 1–2 (Mound 1972).

***Stephanothrips* Trybom**

Stephanothrips Trybom, 1913: 42. Type species *Stephanothrips buffai* Trybom, 1913, by monotypy.

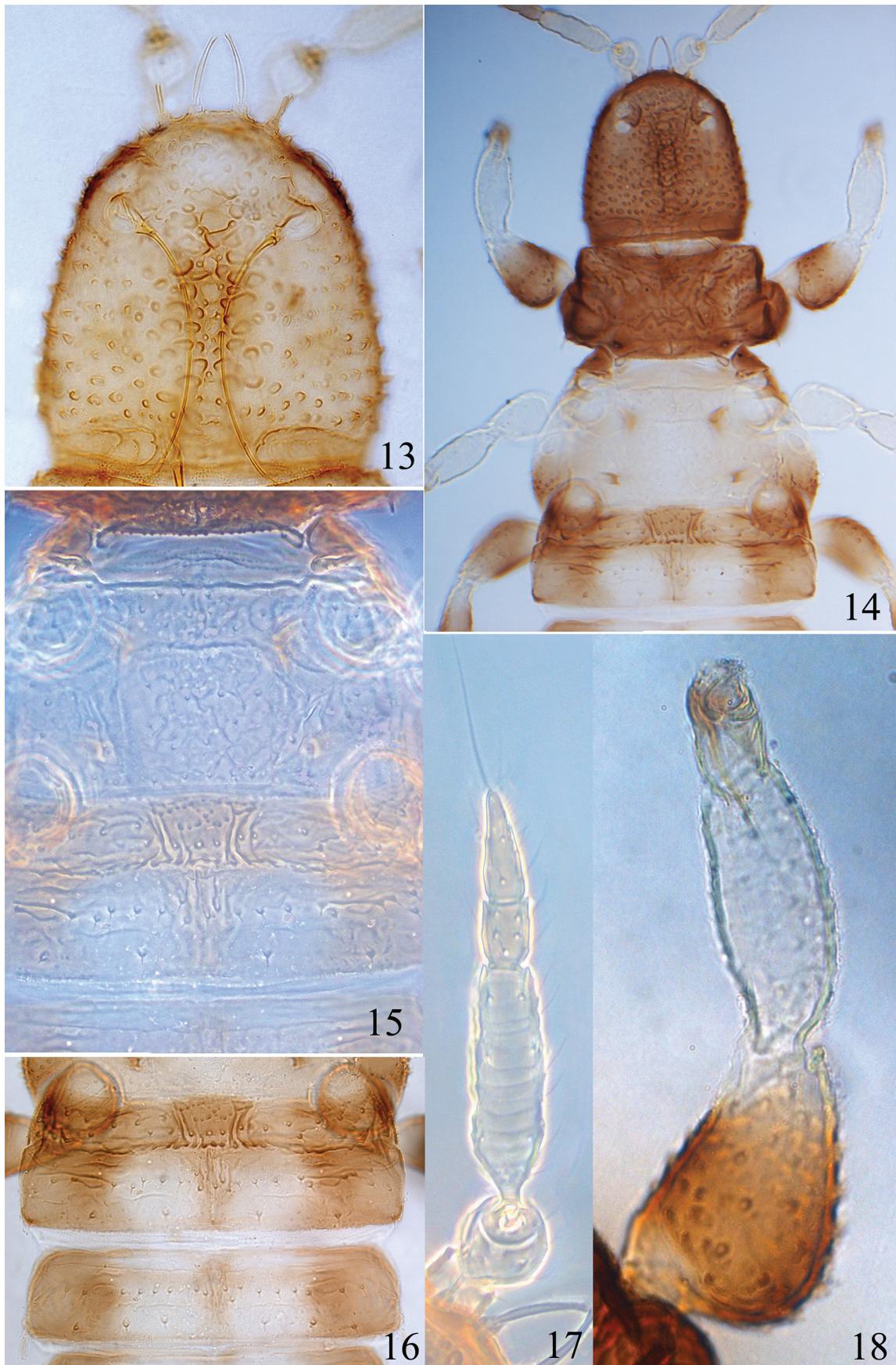
This is the largest urothripine genus, with 30 named species in the world (ThripsWiki 2017). Nearly 70% of these species are known from Asia, particularly Southeast Asia (Kudô 1978, 1989; Okajima 1976, 1982, 1989, 1994, 2006; Okajima & Urushihara 1995), although some are from southern USA, and one from South Africa. With the new species described here, five species of *Stephanothrips* are now known from China (Okajima 1976; Wang & Tong 2007; Dang & Qiao 2014).

***Stephanothrips austrinus* sp. n.**

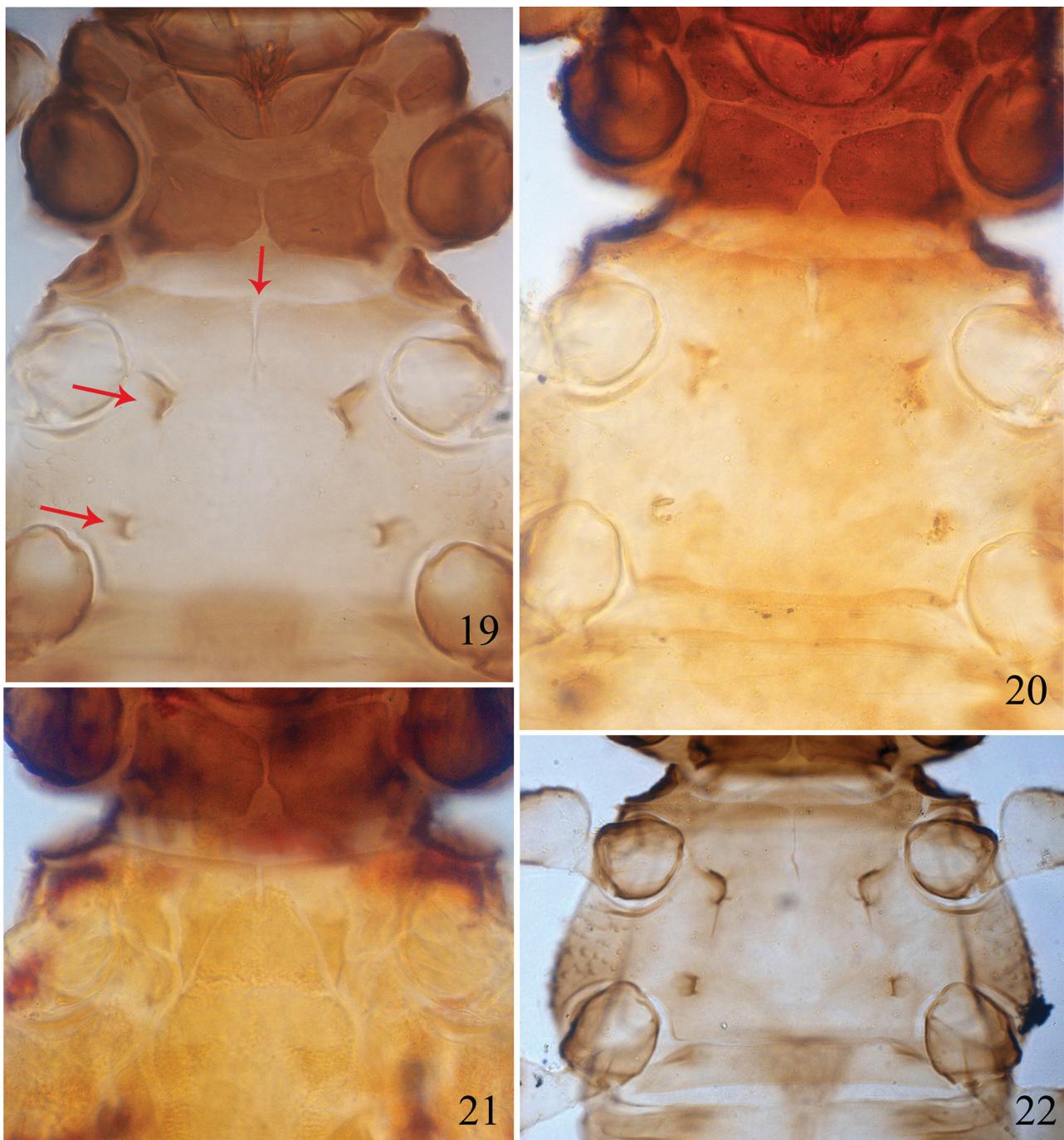
(Figs 1, 13–19, 30)

Female. Apterous (Fig. 1). Head and prothorax brown; pterothorax yellow, but mesothorax with brown areas anterolaterally and metathorax brown laterally. Abdominal tergite I brown, tergites II–VIII yellow with brown markings laterally, tergite IX yellow with lateral margin brown, tube yellow with extreme apex brown. Antennae yellow except segments IV–V brown. Fore coxae brown, fore femora brown with yellow apically and basally, fore tibiae yellow; mid legs yellowish white; hind legs largely brown, but bases and apices of femora and tibiae yellow; all tarsi pale yellow with a brown marking apically.

Head (Fig. 13) slightly longer than wide, dorsal surface and cheeks strongly tuberculate; cheeks gradually widened towards base, but constricted at base; anterior margin of head slightly produced and arched in front of eyes, with 2 pairs of anterior cephalic setae, inner pair long and knobbed at apices, outer pair short and slightly dilated at apices, about 1/4–1/3 length of inner pair (Fig. 13). Eyes each with only 3 ommatidia dorsally; ocelli absent. Antennae 5-segmented (Fig. 17), segment III (morphological segments III–V) longer than other segments and with indistinct sutures between the morphological segments, the fifth visible segment with an incomplete suture between morphological segments VII and VIII; antennal segment III with 3 sense cones (morphological segment IV with 2 sense cones and V with 1). Maxillary stylets retracted as far as eyes, subparallel and about one-sixth head width apart medially.



FIGURES 13–18. *Stephanothrips austrinus* sp. n.: (13) head; (14) head and thorax; (15) meso- and metanotum, abdominal tergites I–II; (16) abdominal tergites I–III; (17) antenna; (18) fore leg.



FIGURES 19–22. Mesoeusternum, meso- and metafurcae of *Stephanothrips* spp.: (19) *S. austrinus* sp. n.; (20) *S. japonicus*; (21) *S. kentingensis*; (22) *S. occidentalis*

Pronotum (Fig. 14) transverse approximately 1.8 times as wide as long, dorsal surface sculptured with irregular wrinkles medially and being surrounded by small tubercles; pronotum with a pair of prominent epimeral setae, slightly dilated at apices; epimeral suture incomplete. Basantra present laterally but weak and membranous submedially; ferna well-developed and separated (Fig. 19). Meso- and metanotum weakly sculptured medially (Fig. 15), metaepimera slightly bulged, with small tubercles but lacking major setae; mesopresternum weak and membranous; anterior margin of mesoeusternum with a longitudinal median split (Fig. 19); meso- and metafurcae situated laterally and widely separated (Fig. 19). Legs short and tuberculate; fore tarsus without hamus (Fig. 18), hind tarsi each with a dorsal claw.

Abdomen broadest at segment II and tapering evenly to the tube. Abdominal tergite I transverse and distinctly sculptured, closely fused to tergite II (Fig. 15), and clearly separated with metanotum; tergite II with two pairs of

minute posteromarginal setae and a transverse row of 18–20 minute setae (Fig. 16), posterolateral setae minute with similar size as postermarginal setae; tergites III–VIII each with a pair of well-developed spatulate posterolateral setae, and intermediate tergites each with three pairs of short posteromarginal setae and a transverse row of 14–20 minute setae; tergite IX near 1.9 times as long as maximum wide, slightly shorter than head. Tube about 9 times as long as apical width, about 1.3 times as long as head; tube with 6 terminal setae apparently equal in length, anal setae 2.8 times as long as tube.

Measurements (holotype female in microns). Total distended body length 1430. Head length 180, maximum width 173. Pronotum length 105, median width 195. Abdominal tergite IX length 170, maximum width near base 100 and distal width 40. Tube length 230, basal width 20 and apical width 28. Antennae segments I to V length (width) as follows: 20 (25), 28 (30), 93 (25), 24 (16), 38 (14). Length of setae: inner pair of cephalic setae 40, outer pair 10; pronotal epimeral setae 15; anal terminal setae about 580.

Male. Unknown.

Specimens examined (all specimens were collected from leaf-litter unless otherwise noted). Holotype female (in SCAU): **CHINA, Guangdong**, Guangzhou City, Conghua, Liangkou Town, Niulu (24°74'N, 113°73'E), collected from leaf litter, 29.xi.2011 (Shulan Yang).

Paratypes (in SCAU, all specimens were collected from leaf litter unless otherwise noted): 9 females, collected with holotype. **Guangdong**, Zhaoqing City, Dinghushan National Nature Reserve (23°10'N, 112°32'E), 6 females, 4.vi.1985 (Xiaoli Tong). Huizhou City, Mt. Nankunshan (23°38'38"N, 113°50'49"E), 1 female, 14.xi.2001 (Zhiwei Li). Shixing County, The Chebaling National Nature Reserve (24°42'N, 114°11'E), 5 females, 10.x.2002 (Zhiwei Li). Yingde City, Shimantai Nature Reserve (24°24'30"N, 113°18'18"E), 3 female, 12.iv.2002 (Zhiwei Li), 2 females, 7.iv.2011 (Tao Song). Guangzhou City, Conghua, Sanyatang (23°44'N, 113°48'E), 12 females, 28.x.2004 (Jun Wang). Haifeng County, Mt. Lianhuashan (23°03'N, 115°15'E), 1 female, 13.iii.2005, 2 females, 4.v.2005 (Jun Wang). Guangzhou City, Longdong Forest Park (23°14'N, 113°24'E), 2 females, 4.v.2005 (Jun Wang). Xinyi City, Mt. Tianmashan (22°27'N, 110°41'E), 3 females, 2.iv.2011 (Tao Song), 6 females, 21.viii.2011 (Tao Song), 1 female, 18.ix.2011 (Tao Song). Dongguan City, Mt. Yinpingshan (22°54'09"N, 114°09'42"E), 1 female, 10.ix.2014 (Chao Zhao). Guangzhou City, Conghua, Liangkou Town, Xitou (23°43'N, 113°51'E), 1 female, 28.viii.2015 (Chao Zhao). **Jiangxi**, Jinggangshan City, Mt. Jinggangshan National Nature Reserve (114°7'E, 26°37'N, alt.1200m), 1 female from dead leaves of *Cryptomeria fortune* (Taxodiaceae), 26.viii.2015 (Chao Zhao).

Distribution. China (Guangdong, Jiangxi).

Etymology. The specific epithet, *austrinus*, is from the Latin adjective, meaning “southern”, in reference to this new species is so far mainly distributed in the southern China.

Comments. This new species appears to be closely related to *S. kentingensis* and *S. zonatus*; all three have two pairs of anterior cephalic setae—inner pair elongate, outer pair short. However, *kentingensis* differs from this new species as follows: antennal segment IV, hind femora (including coxae) and abdominal tergite I largely yellow (brown in *austrinus*); pronotal epimeral setae apparently tiny or absent (well-developed in *austrinus*). The new species can also be distinguished from *zonatus* by the fore tarsus lacking an external hook-like hamus (present in *zonatus*).

The genus *Stephanothrips* differs from *Baenothrips*, *Bradythrips* and *Urothrips* on very minor characteristics (Mound 1972; Okajima 2006; Ulitzka & Mound 2014). Recently, Ulitzka and Mound (2014) produced a new diagnosis of the genus *Urothrips*. Although they mentioned “basantra absent” in *Urothrips*, it actually could be interpreted as “basantra present but reduced to small lateral plates” (personal communication with Laurence Mound). These lateral plates are the same as those found in the above four genera. During the examination of a series of Chinese urothripine specimens, we found one of thoracic structural characters, the meso- and metafurcae placed laterally and widely separated, could be used to separate *Stephanothrips* from other members in the key to genera of urothripine. This character was previously mentioned by Stannard (1970) and Mound (1972), but most published figures of *Stephanothrips* do not show detail of this character, or it is usually neglected or understated in descriptions. This thoracic structural character is probably associated with the extreme apterous condition in this lineage.

There are two distribution patterns of the genus *Stephanothrips* in China (Fig. 30). Two species seem to have a more restricted distribution, but the other three species, *S. japonicus*, *S. occidentalis* and *S. austrinus* sp. n., are widely distributed in China. *S. occidentalis* is widespread in the tropics and subtropics of world (Mound 1972; Okajima 1994; Diffie *et al.* 2008). Unlike the other *Stephanothrips* species that are found mainly in leaf litter, dead

twigs or top soil layers, *S. occidentalis* is found not only in leaf litter, but also on fresh leaf or stem of various living plants, and is likely to be dispersed by wind (Mound 1972). *S. japonicus* (Fig 30) also has a wide geographical range, from Japan, Taiwan and mainland China (Okajima 1994, 2006; Wang & Tong 2007), and is also known from southeastern U.S.A. (Diffie *et al.* 2008). Despite this, no males have ever been found in China. *S. austrinus* is widely distributed in Guangdong province, southern China, and often co-occurs with *S. japonicus*.

***Stephanothrips formosanus* Okajima**

Stephanothrips formosanus Okajima, 1976: 404.

Specimens examined. Not studied. The distribution information is based on Okajima (1976, 2006).

Distribution. China (Taiwan); Japan.

***Stephanothrips japonicus* Saikawa**

(Figs 2, 20, 30)

Stephanothrips japonicus Saikawa, 1974: 7.

Specimens examined (all specimens were collected from leaf-litter unless otherwise noted). **CHINA. Shandong**, Tai'an City, Mt.Taishan (36°13'35"N, 117°5'35"E), 10 females, 2.ix.2014 (Zhaohong Wang). **Hubei**, Huanggang City, Yingshan County, Taohuachong Forest Park (30°59'N, 116°2'E), 1 female, 26.viii.2014 (Chao Zhao). **Zhejiang**, Jinhua City, Shuanglongdong Scenic Area (29°12'15"N, 119°37'12"E, alt. 400m), 12 females, 7.vii.2014 (Xiaoli Tong). **Guizhou**, Jiangkou County, Fanjingshan National Nature Reserve (27°75'N, 108°80'E), 2 females, 10.viii.1987 (Xiaoli Tong). Daozhen County, Dashuhe Nature Reserve (29°11'N, 107°33'E, alt. 1280m), 21.viii.2014 (Zhigang Jiang). **Hunan**, Zhangjiajie City, Zhangjiajie National Forest Park (29°12'N, 110°27'E), 5 females, 25.vii.1987 (Xiaoli Tong). Shennong Valley, Yanling (26°29'N, 114°1'E), 3 females, 12.ix.2013 (Chao Zhao). **Jiangxi**, Lianhua County, Gaozhou Town, Huangshacun (27°24'N, 114°1'E), 6 females, 10.xii.2013 (Shulan Yang). **Yunnan**, Jinghong City, 20 females from top soil, 5.iii.1985, collector unknown. **Guangdong**, Zhaoqing City, Dinghushan National Nature Reserve (23°10'N, 112°32'E), 2 females, 4.vi.1985 (Weiqiu Zhang); 4 females, 12.xi.2001 (Zhiwei Li). Fengkai County, Heishiding National Nature Reserve (23°27'N, 111°54'E), 2 females, 4.vi.1987 (Xiaoli Tong). Shixing County, The Chebaling National Nature Reserve (24°42'N, 114°11'E), 3 females, 5.viii.1988 (Weiqiu Zhang); 3 females, 2.xi.1989 (Xiaoli Tong); 29 females, 10.x.2002 (Zhiwei Li). Yingde City, Shimentai Nature Reserve (24°41'N, 113°31'E), 9 females, 12.xi.2001 (Zhiwei Li); 3 females on 7.iv.2011 (Tao Song). Huizhou City, Mt. Nankunshan (23°38'N, 113°50'E), 18 females, 11.xii.2002 (Zhiwei Li). Guangzhou City, Longdong Forest Park (23°14' N, 113°24' E), 2 females, 29.ii.2004 (Jun Wang). Guangzhou City, Conghua, Sanyatang (23°44'N, 113°48'E), 16 females, 28.x.2004 (Jun Wang). Huizhou City, Mt. Luofushan (31°35'N, 104°20'E), 4 females, 10.xii.2004 (Jun Wang). Foshan City, Heshui Town (22°29'N, 111°30'E), 2 females, 27.iii.2005 (Jun Wang). Lianzhou City, Dadongshan National Nature Reserve (24°55'N, 112°42'E), 3 females, 28.ix.2010 (Tao Song). Xinyi City, Mt. Tianmashan (22°27' N, 110°41'E), 1 female, 21.viii.2011 (Tao Song). Renhua County, Hukeng, 15 females, 31.iii.2012 (Xiaoli Tong). Guangzhou City, South China Agricultural University Arboretum (23°09'22"N, 113°21'15"E), 1 female, 29.xii.2013 (Chao Zhao). Guangzhou City, Huolushan Forest Park (23°11'2"N, 113°22'47"E), 3 females, 25.v.2014 (Jingna Li). Shenzhen City, Mt. Wutongshan (22°33'38"N, 114°13'34"E, alt.110m), 53 females, 1.vi.2014 (Jingna Li). Dongguan City, Mt. Yinpingshan (22°54'09"N, 114°09'42"E), 2 females, 10.ix.2014 (Chao Zhao). Gaozhou City, Mt. Sanguanshan (21°55'10"N, 111°8'40"E), 1 female collected from leaf litter of *Acacia auriculiformis* (Leguminosae), 15.xii.2014 (Chao Zhao). **Taiwan**, Nan Shan Chi, 1 female from dead branches, 26.vii.1975 (S. Okajima leg.), slide No. F-28(29) (SO, TUA).

Distribution. China (Shandong, Hubei, Zhejiang, Guizhou, Yunnan, Hunan, Jiangxi, Guangdong, Taiwan); Japan; USA (Georgia).

***Stephanothrips kentingensis* Okajima**

(Figs 3, 21, 30)

Stephanothrips kentingensis Okajima, 1976: 407.

Specimen examined. CHINA. Taiwan, Pingtung, Kenting, 1 female from leaf litter, 14.iii.1977 (T. Senoh leg.), slide No. F-59 (SO, TUA).

Distribution. China (Taiwan); Japan.

***Stephanothrips occidentalis* Hood & Williams, 1925**

(Figs 4, 22, 30)

Stephanothrips occidentalis Hood & Williams, 1925: 69

Specimens examined (all specimens were collected from leaf-litter unless otherwise noted). CHINA. Yunnan, Mengla County, Menglun Town, Xishuangbanna Tropical Botanical Garden (21°55'45"N, 101°15'04"E), 1 female, 13.iv.1987 (Weiqiu Zhang). Jinghong City, The Institute of Tropical Crops (22°00'18"N, 100°47'11"E), 1 female, 5.iv.1987 (Xiaoli Tong). Guangdong, Fengkai County, Heishiding National Nature Reserve (23°27'N, 111°54'E), 1 female, 4.vi.1987 (Xiaoli Tong). Zhaoqing City, Dinghushan National Nature Reserve (23°10'N, 112°32'E), 1 female, 4.viii.2001 (Zhiwei Li). Xinyi City, Mt. Tianmashan (22°27'N, 110°41'E), 1 female, 7.iv.2011 (Tao Song). Dongguan City, Mt. Yinpingshan (22°54'09"N, 114°09'42"E), 2 females, on fresh leaf of fern *Stenoloma chusanum* (Lindsaeaceae), 10.ix.2014 (Chao Zhao). Gaozhou City, Mt. Sanguanshan (21°55'10"N, 111°8'40"E), 3 females collected from dead twigs of *Acacia auriculiformis* (Leguminosae), 15.xii.2014 (Chao Zhao). Shenzhen City, Mt. Wutongshan (22°33'38"N, 114°13'34"E, alt.110m), 1 female collected from fresh leaf of a shrub, 19.xii.2015 (Zhaohong Wang). Hainan, Danzhou City, The Tropical Botanic Garden (22°54'09"N, 114°09'42"E), 1 female from fresh leaf of unknown plant, 19.x.2014 (Chao Zhao). Baisha County, Yinggeling National Nature Reserve, Yinggezui Protection Station (19°02'N, 109°33'E), 1 female, 29.iv.2011 (Tao Song), 16 females, 18.x.2014 (Chao Zhao), 1 female collected from fresh leaf of *Argyreia acuta* (Convolvulaceae), 9.i.2016 (Xiaoli Tong). INDONESIA. Bali Is., Pegok, 25.vii.1984 (S. Okajima leg.), slide No.In-62 (SO, TUA).

Distribution. China (Yunnan, Guangdong, Hainan, Taiwan); Japan; Indonesia; USA; West Indies. Widespread in the tropics and subtropics in the world.

***Urothrips* Bagnall**

Urothrips Bagnall, 1909: 126. Type species *Urothrips paradoxus* Bagnall, 1909, by monotypy.

With the new species described below, this genus now includes 10 species, all from the Old World tropics (Ulitzka & Mound 2014).

***Urothrips calvus* sp. n.**

(Figs 23–30)

Female. Apterous (Fig. 23). Head and prothorax brown; pterothorax yellow, but mesothorax with brown areas anterolaterally and metathorax light brown laterally. Abdominal tergite I yellowish brown, tergites II–VIII yellow with brown markings laterally, tergite IX yellow with lateral margin brown, tube yellow with extreme apex brown. Antennae segments I–III yellow, IV–V yellowish brown. Fore coxae brown, fore femora brown with yellow apically, fore tibiae yellow; mid legs yellow, but coxae pale yellowish brown; hind legs brown, but femora and tibiae with extreme pale bases and apices; all tarsi pale yellow with a brown marking apically.

Head (Figs 24, 25) slightly longer than wide, dorsal surface and cheeks strongly tuberculate; cheeks gradually widened towards base and constricted at base; head broadly rounded in front, without any longer cephalic setae on

anterior margin. Eyes each with only 3 ommatidia dorsally; ocelli absent. Antennae 5-segmented (morphological segments III–V united) (Fig. 26), segment III longest, with indistinct suture between morphological segments, segment V with an incomplete suture between morphological segments VII and VIII; antennal segment III with 3 sense cones (morphological segment VI with 2 sense cones and V with 1). Maxillary stylets retracted to eyes, about one-eighth head width apart medially.

Pronotum (Fig. 24) transverse, approximately 1.8 times as wide as long, dorsal surface sculptured with irregular wrinkles medially and being surrounded by small tubercles; pronotum with a pair of prominent epimeral setae (Fig. 24), slightly dilated at apices; epimeral suture incomplete. Basantra present laterally but weak and membranous submedially; ferna well-developed (Fig. 27). Meso- and metanotum weakly sculptured medially, metaepimera slightly swollen, with small tubercles but lacking any epimeral setae; mesopresternum reduced and membranous; anterior margin of mesoeusternum with a longitudinal median split (Fig. 27); meso- and metafurcae placed laterally and widely separated (Fig. 27). Legs short and tuberculate; fore tarsus without humus, hind tarsi each with a dorsal claw.

Abdomen broadest at segment II and tapering evenly to the tube. Abdominal tergite I transverse and distinctly sculptured, closely fused to tergite II (Fig. 28), and clearly separated from metanotum; tergite II with two pairs of minute posteromarginal setae and a transverse row of 18–20 minute setae, posterolateral setae minute with similar size as postermarginal setae; tergites III–VIII each with a pair of well-developed spatulate posterolateral setae (Fig. 29), and intermediate tergites each with three pairs of short posteromarginal setae and a transverse row of 14–20 minute setae; tergite IX near 1.8 times as long as maximum wide, slightly shorter than head. Tube about 9 times as long as apical width, about 1.3 times as long as head; tube with 6 terminal setae apparently equal in length, anal setae 2.8 times as long as tube.

Measurements (holotype female in microns). Total distended body length 1310. Head length 188, maximum width 175. Pronotum length 110, median width 200, epimeral setae 13. Abdominal tergite IX length 175, maximum width near base 100 and distal width 45. Tube length 245, basal width 23 and apical width 28. Antennae segments I to V length (width) as follows: 20 (25), 30 (30), 95 (26), 23 (18), 38 (15). Anal terminal setae about 600.

Male. Unknown.

Specimens examined. Holotype female (in SCAU): **CHINA, Jiangxi:** Jinggangshan City, Jinggangshan National Nature Reserve (114°7'4"E, 26°37'23"N, alt.1240m), in leaf litter of *Cryptomeria fortunei* (Taxodiaceae), 26.viii.2015 (Chao Zhao). Paratypes (in SCAU): 8 females, collected with holotype.

Distribution. China (Jiangxi).

Etymology. The specific epithet, *calvus*, is from the Latin adjective, meaning “bald-headed”, in reference to the anterior margin of head without any cephalic setae.

Comments. This new species differs from most species placed in *Urothrips* in having antenna 5-segmented (morphological segments III–V united), eyes reduced to only 3 ommatidia, the meso- and metafurcae placed laterally and widely separated, and anterior margin of mesoeusternum usually having a longitudinal median division. Although *U. kobroi* Ulitzka & Mound is similar to *U. calvus* by sharing antenna with 5 segments, the following combination of characteristics readily distinguish that species from *calvus*: (1) eyes with about 8 facets dorsally; (2) pronotal epimeral setae minute; (3) fore tarsi with a sharply recurved hamus on external margin; (4) mesoeusternum anterior margin entire; (5) abdominal tube slightly longer than segment IX. Although the appearance and color pattern of *U. calvus* are similar to *Stephanothrips* species, particularly to *S. austrinus*, *U. calvus* lacks any prominent cephalic setae on the anterior margin of the head, in contrast to all *Stephanothrips* species.

Urothrips gibberosa (Kudô, 1989)

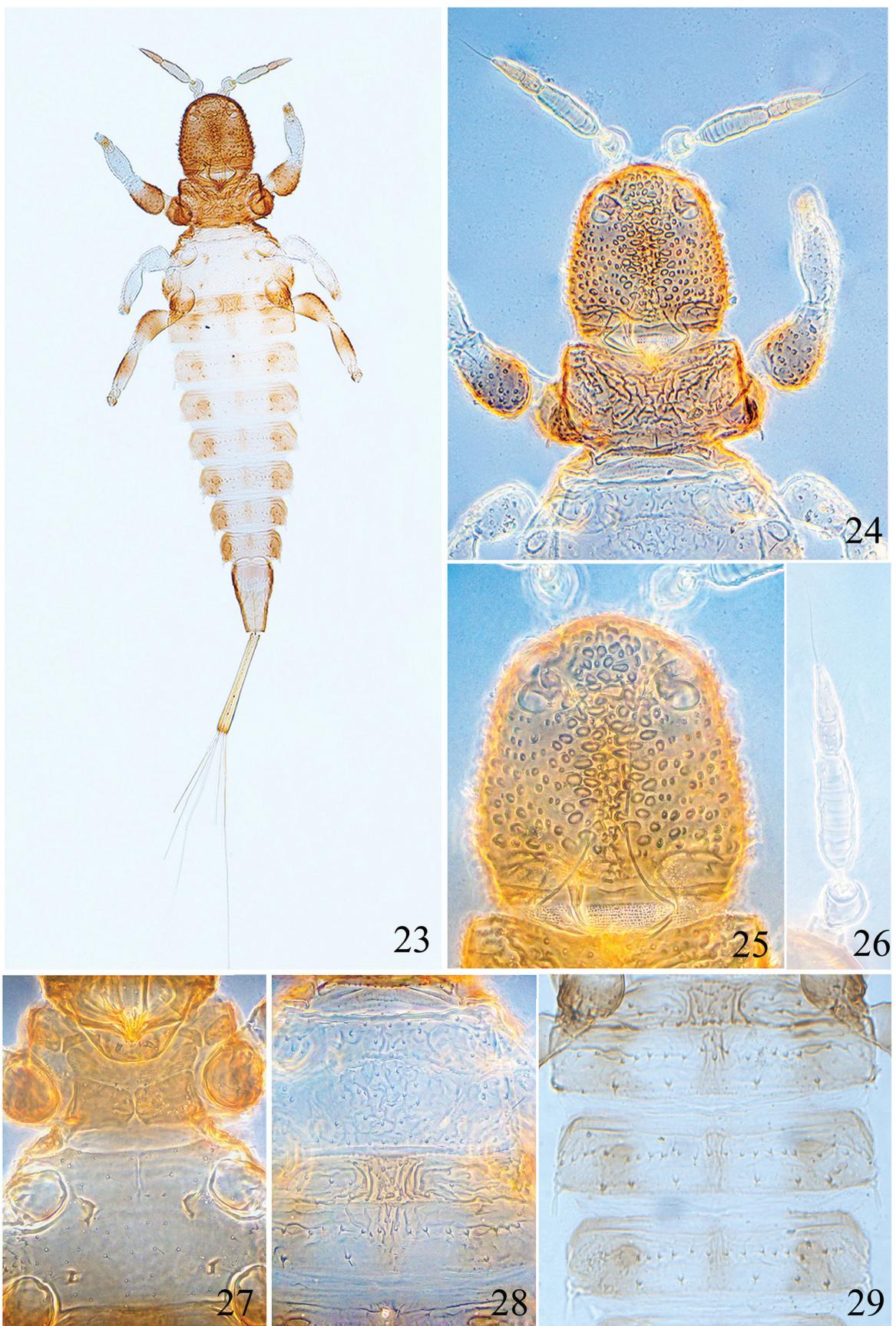
Ananthakrishnaniella gibberosa Kudô, 1989: 84.

Coxothrips gibberosa (Kudô): Bhatti, 1998: 178; Dang & Qiao, 2012: 890.

Urothrips gibberosa (Kudô): Ulitzka & Mound: 2014: 598.

Specimens examined. **China**, Tibet (Bomi County), 1 female, on dry fallen leaves, 22-viii-2011, leg. Chen J, No. JM10744-1(NZMC).

Distribution. China (Tibet); Nepal.



FIGURES 23–29. *Urothrips calvus* sp. n.: (23) habitus of female; (24) head and thorax; (25) head; (26) antenna; (27) ventral view of thorax; (28) meso- and metanotum, abdominal tergites I–II; (29) abdominal tergites I–III.



FIGURE 30. Distribution map of *Stephanothrips* species in China.

***Urothrips tarai* (Stannard, 1970)**

Ananthakrishnaniella tarai Stannard, 1970: 119.

Coxothrips tarai (Stannard): Bhatti, 1998: 178; Dang & Qiao, 2012: 891.

Urothrips tarai (Stannard): Ulitzka & Mound: 2014: 598.

Specimens examined. **CHINA, GUANGDONG:** Gaozhou City, Mt. Sanguanshan (21°55'10"N, 111°8'40"E), 2 females and 3 males collected from leaf litter of *Acacia auriculiformis* (Leguminosae), 5.ix.2015 (Zhaohong Wang). **HAINAN:** Baisha County, Yinggeling National Nature Reserve, Yinggezui Protection Station (19°02'N, 109°33'E), 1 female, 29.iv.2011 (Tao Song), 2 females, 18.x.2014 (Jingna Li) collected from leaf litter.

Distribution. China (Yunnan, Guangdong, Hainan); India.

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